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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BOARD OF PATENT APPEALS AND INTERFERENCES

In re patent application of:
Shorey, et al.
Serial No.: 09/680,168

Filed: October 5, 2000

Group Art Unit: 2665

Examiner: Ryman, Daniel J.

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Mohammad S. Rahman

For: NEW METHODOLOGY FOR IMPROVING THE PERFORMANCE OF ASYNCHRONOUS DATA TRAFFIC OVER THE TDD/TDMA WIRELESS NETWORK

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPELLANTS' APPEAL BRIEF

Sirs:

Appellants respectfully appeal the final rejection of claims 1-15 in the Office Action dated January 11, 2005. A Notice of Appeal was timely filed on April 4, 2005.

I. REAL PARTY IN INTEREST

The real party in interest is International Business Machines Corp., Armonk, New York, assignee of 100% interest of the above-referenced patent application.

II. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to Appellants, Appellants' legal representative or Assignee which would directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

Claims 1-15 are all the claims pending in the application and are set forth fully in the attached appendix. Claims 1-15 were originally filed in the application. A first Office Action was issued on September 15, 2004 rejecting claims 1-15. Appellants filed an Amendent under 37 C.F.R. §1.111 on October 20, 2004 amending claims 1-3, 5-8, and 10-15. An after-final Office Action was issued on January 11, 2005 rejecting claims 1-15 and objecting to the specification. Appellants filed an Amendent under 37 C.F.R. §1.116 on March 1, 2005 further amending claims 1-2, 6-7, and 11-12 and the specification. An Advisory Action was issued on March 29, 2005 rejecting claims 1-15. The objections to the specification are not maintained in the Advisory Action, and thus are deemed overcome.

Claims 1, 5, 6, 10, 11 and 15 stand rejected under 35 U.S.C. §102(e) as being anticipated by Johansson, et al. (U.S. Patent No. 6,480,505), hereinafter referred to as "Johansson". Claims 2, 4, 7, 9, 12 and 14 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Johansson. Claims 3, 8 and 13 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Johansson, in view of Appellant' admitted prior art.

IV. STATEMENT OF AFTER-FINAL AMENDMENTS

An after-final Office Action dated January 11, 2005 stated all the pending claims 1-15 were rejected. Appellants filed an Amendent under 37 C.F.R. §1.116 on March 1, 2005 further amending claims 1-2, 6-7, and 11-12. An Advisory Action was issued on March 29, 2005 indicating that the Amendment filed on March 1, 2005 would be entered for purposes of appeal, but that claims 1-15 were rejected. The claims shown in the appendix are shown in their

amended form as of the March 1, 2005 amendment.

V. SUMMARY OF THE INVENTION

The Appellants' invention is described in pages 6 through 24 of the specification and shown in Figures 1 through 9 of the application as originally filed, whereby an object of Appellants' invention is to obviate the drawbacks by providing an efficient methodology for data transmission over TDD/TDMA wireless networks.

To achieve the objective, Appellants' invention provides a computer implemented system for transferring data over a master driven TDD/TDMA based wireless network characterized in that it operates with minimum delay in end-to-end transmission by including means (see page 12, line 25 through page 14, line 15 of the specification, and the flowchart provided in Figure 3 for a description of this means plus function aspect of the claimed invention) for achieving optimum time slot utilization by minimizing the number of baseband packets created for each Link layer packet, each baseband packet being of a size corresponding to one of a permitted set of capacities 'C1, C2,.....Cn', wherein minimizing the number of baseband packets created for the each Link layer packet comprises converting the Link layer packet into as many baseband packets of highest capacity 'Cn' as possible and repeating a conversion process on unconverted bytes using each successive lower capacity baseband packet size until all the unconverted bytes have been converted into the baseband packets; and means (see page 15, line 12 through page 18, line 2 of the specification, and the flowchart provided in Figure 4 for a description of this means plus function aspect of the claimed invention) for optimum sharing of bandwidth, higher link utilization and low baseband packet transmission queue occupancy by adaptive scheduling of the transmission of the baseband packets in the queues. The means for minimizing the number of baseband packets created for the each Link layer packet is an SAR-OSU algorithm (see page 12, line 25 through page 14, line 15 of the specification, and the flowchart provided in Figure 3 for a description of this means plus function aspect of the claimed invention). The master driven TDD/TDMA based wireless network comprises a Bluetooth network and the Link layer packet comprises a L2CAP packet. The means for adaptive scheduling of transmission is an 'AFP' algorithm whereby a baseband packet transmission queue with a size greater than a defined threshold is continuously polled for a defined number of transmissions as long as its size remains greater than the defined threshold (see page 15, line 12 through page 18, line 2 of the

specification, and the flowchart provided in Figure 4 for a description of this means plus function aspect of the claimed invention). The system further comprises means (see page 19, line 17 through page 20, line 4 of the specification, and the lower left-hand side of the flowchart provided in Figure 4 for a description of this means plus function aspect of the claimed invention) for increasing the transmission polling interval for a baseband packet transmission queue with low packet traffic when a 'poll' packet is sent instead of a 'data' packet.

Another aspect of the invention provides a computer implemented method for transferring data over a master driven TDD/TDMA based wireless network characterized in that it operates with minimum delay in end-to-end transmission by achieving optimum time slot utilization by minimizing the number of baseband packets created for each Link layer packet (see page 12, line 25 through page 14, line 15 of the specification, and the flowchart provided in Figure 3 for a description of this step of the claimed invention), each baseband packet being of a size corresponding to one of a permitted set of capacities 'C1, C2,.....Cn', wherein minimizing the number of baseband packets created for the each Link layer packet comprises converting the Link layer packet into as many baseband packets of highest capacity 'Cn' as possible and repeating a conversion process on unconverted bytes using each successive lower capacity baseband packet size until all the unconverted bytes have been converted into the baseband packets; and maintaining optimum sharing of bandwidth, higher link utilization and low baseband packet transmission queue occupancy by adaptive scheduling of the transmission of the baseband packets in the queues (see page 15, line 12 through page 18, line 2 of the specification, and the flowchart provided in Figure 4 for a description of this step of the claimed invention). The step of minimizing the number of the baseband packets created for the each Link layer packet is accomplished by an SAR-OSU algorithm (see page 12, line 25 through page 14, line 15 of the specification, and the flowchart provided in Figure 3 for a description of this step of the claimed invention). The master driven TDD/TDMA based wireless network comprises a Bluetooth network and the Link layer packet comprises a L2CAP packet. The adaptive scheduling of transmission is accomplished by an 'AFP' algorithm whereby a queue with a size greater than a defined threshold is continuously polled for a defined number of transmissions as long as its size remains greater than the defined threshold (see page 15, line 12 through page 18, line 2 of the specification, and the flowchart provided in Figure 4 for a description of this step of the claimed invention). The method further comprises increasing the transmission polling

interval for a baseband packet transmission queue with low packet traffic when a 'poll' packet is sent instead of a 'data' packet (see page 19, line 17 through page 20, line 4 of the specification, and the lower left-hand side of the flowchart provided in Figure 4 for a description of this means plus function aspect of the claimed invention).

Another embodiment of the invention provides a computer program product comprising computer readable program code stored on computer readable storage medium embodied therein for causing a computer to transfer data over a master driven TDD/TDMA based wireless network characterized in that it operates with minimum delay in end-to-end transmission by including a computer readable program code (see page 12, line 25 through page 14, line 15 of the specification, and the flowchart provided in Figure 3 for a description of this step plus function aspect of the claimed invention) adapted to achieving optimum time slot utilization by minimizing the number of baseband packets created for each Link layer packet, each baseband packet being of a size corresponding to one of a permitted set of capacities 'C1, C2,.....Cn', wherein minimizing the number of baseband packets created for the each Link layer packet comprises converting the Link layer packet into as many baseband packets of highest capacity 'Cn' as possible and repeating a conversion process on unconverted bytes using each successive lower capacity baseband packet size until all the unconverted bytes have been converted into the baseband packets; and a computer readable program code (see page 15, line 12 through page 18, line 2 of the specification, and the flowchart provided in Figure 4 for a description of this step plus function aspect of the claimed invention) adapted to implementing optimum sharing of bandwidth, higher link utilization and low baseband packet queue occupancy by adaptive scheduling of the transmission of the baseband packets in the queues. The computer readable program code adapted to minimizing the number of baseband packets created for the each Link layer packet is an SAR-OSU algorithm (see page 12, line 25 through page 14, line 15 of the specification, and the flowchart provided in Figure 3 for a description of this step plus function aspect of the claimed invention). The master driven TDD/TDMA based wireless network comprises a Bluetooth network, and the Link layer packet comprises a L2CAP packet. The computer readable program code adapted to adaptive scheduling for transmission comprises an 'AFP' algorithm whereby a queue with a size greater than a defined threshold is continuously polled for a defined number of transmissions as long as its size remains greater than the defined threshold (see page 15, line 12 through page 18, line 2 of the specification, and the flowchart

provided in Figure 4 for a description of this step plus function aspect of the claimed invention). The computer readable program code further comprises a computer readable program code adapted to increasing the transmission polling interval for a baseband packet transmission queue with low packet traffic when a 'poll' packet is sent instead of a 'data' packet (see page 19, line 17 through page 20, line 4 of the specification, and the lower left-hand side of the flowchart provided in Figure 4 for a description of this step plus function aspect of the claimed invention).

VI. ISSUES PRESENTED FOR REVIEW

The issues presented for review by the Board of Patents Appeals and Interferences are (1) whether claims 1, 5, 6, 10, 11, and 15 are unpatentable under 35 U.S.C. §102(e) as being unpatentable over Johansson; (2) whether claims 2, 4, 7, 9, 12, and 14 are unpatentable under 35 U.S.C. §103(a) as being unpatentable over Johansson; and (3) whether claims 3, 8, and 13 are unpatentable under 35 U.S.C. §102(e) as being unpatentable over Johansson in view of Appellants' admitted prior art.

VII. ARGUMENT

A. The Johansson Reference

Johansson teaches a method and apparatus for improving channel utilization and throughput in an ad-hoc wireless communication system. A master unit and one or more slave units are coupled to a shared communication channel having at least an uplink (UL) channel and a downlink channel (DL) for each master unit-slave unit pair. A group of active nodes is established corresponding to slave units having UL and/or DL data associated therewith for transfer. The group of active nodes may be polled according to Fair Exhaustive Polling (FEP) and information alternately transferred on a TDD. Accumulated information may be transferred in a batch and feedback information collected and used to adjust polling. One or more links may be identified as lossy links due to increased Bit Error Rate (BER) and accompanying information loss resulting in lower throughput. Virtual active nodes added to the group of active nodes to compensate therefore. A transmission parameter such as number of retransmissions may be evaluated against a predetermined threshold to identify lossy links. If lossy links improve, virtual active nodes may be removed from the group of active nodes. Information associated with the one or more slaves units may be circuit switched synchronous information or non-circuit

switched asynchronous information. Feedback information such as timeout information associated with the slave units may be evaluated. If a time out signal associated with a slave unite is received the slave unit may be scheduled for polling responsive to the time out signal.

B. The 35 U.S.C. §102(e) Rejections

1. The Position in the Office Action

The Office Action indicates that with regard to claims 1, 6, and 11, Johansson discloses a computer implemented method and system for transferring data over a master driven TDD/TDMA based wireless network (col. 2, lines 18-48) characterized in that is operates with minimum delay in end-to-end transmission by including the steps of and means for: achieving optimum time slot utilization by minimizing the number of baseband packets created for each Link layer packet, each baseband packet being of a size corresponding to one of a permitted set of capacities 'C1,C2,.. ...Cn' (col. 2, lines 36-38; col. 2, lines 64-col. 3, line 2; and col. 8, lines 15-18), and maintaining optimum sharing of bandwidth, higher link utilization and low baseband packet transmission queue occupancy by adaptive scheduling of the transmission of said baseband packets in said queues (col. 7, lines 14-53 and col. 8, lines 19-53).

Regarding claims 5, 10, and 15, referring to claims 1, 6, and 11, the Office Action suggests that Johansson discloses increasing the transmission polling interval for a baseband packet transmission queue with low packet traffic when a poll packet (null packet) is sent instead of a data packet (col. 6. lines 26-39; col. 7, lines 40-53; and col. 9, lines 24-37).

2. Appellants' Arguments

a. Independent claims 1, 6, and 11

Johansson fails to disclose, teach, or suggest the features of independent claims 1, 6, and 11, and in particular, "wherein minimizing the number of baseband packets created for said each Link layer packet comprises converting said Link layer packet into as many baseband packets of highest capacity 'Cn' as possible and repeating a conversion process on unconverted bytes using each successive lower capacity baseband packet size until all the unconverted bytes have been converted into said baseband packets."

Rather, Johansson merely teaches a system, and related apparatus, for transferring information in packets in a wireless communication network using polling. Contrary to the

assertion in the Office Action, this system sends fragmented, small baseband packets, for example, through a conventional Bluetooth system where the packets are generally smaller than one time slot resulting in wasted time slots and degraded link utilization. In particular, "[w]hen data is transferred on the Bluetooth TDD channel, one packet (must) first be sent from a master to a slave directly followed by a packet sent from a slave to a master. Moreover, the Bluetooth packet size used in either of the directions may occupy, for example, 1, 3, or 5 slots, where one slot is 0.625ms wide." Accordingly, Johansson does not disclose preferentially sending "multi-slot packets" like the Appellants' invention. Therefore, Johansson does not disclose, teach or suggest including each baseband packet being of a size corresponding to one of a permitted set of capacities 'C_1, C_2, ... Cn' let alone "wherein minimizing the number of baseband packets created for said each Link layer packet comprises converting said Link layer packet into as many baseband packets of highest capacity 'Cn' as possible and repeating a conversion process on unconverted bytes using each successive lower capacity baseband packet size until all the unconverted bytes have been converted into said baseband packets" as provided in amended independent claims 1, 6, and 11.

Page 3, paragraph 6 of the Office Action states that "Johansson teaches breaking each link layer packet into variable size baseband packets, i.e. packets that occupy 1, 3, or 5 slots, and repeating the conversion process on the unconverted bytes until all the unconverted bytes have been converted into baseband packets." The Office Action then cites col. 2, lines 36-38; col. 2, line 64-col. 3, line 2; and col. 8, lines 15-18 of Johansson as teaching these features. However, a closer reading of Johansson, and in particular, the cited sections in the Office Action, reveals no such teaching.

First, col. 2, lines 64-col. 3, line 2 of Johansson states, "[i]n addition to controlling data flow to and from slaves in most circumstances using polling as described, a master may control packet size used by a slave to achieve precise control of bandwidth and delay in the piconet. Accordingly, control over, for example Quality of Service (QoS) levels, particularly as they relate to delay factors may be achieved." There is nothing in the quoted language that even remotely suggests repeating a conversion process on unconverted bytes using each successive lower capacity baseband packet size until all the unconverted bytes have been converted into said baseband packets as provided in the claimed invention. Rather, the quoted language (and the context in which it is taken) in Johansson merely refers to controlling master-slave data flow to

achieve bandwidth control. However, this does not equate to the conversion process described above and provided in the Appellants' independent claims 1, 6, and 11.

Second, col. 8, lines 15-18 of Johansson states, "In addition, bit error rates associated with the communication channel may be at a level where shorter packet sizes may yield a better throughput than longer." Again, there is nothing in the quoted language that even remotely suggests repeating a conversion process on unconverted bytes using each successive lower capacity baseband packet size until all the unconverted bytes have been converted into said baseband packets as provided in the claimed invention. Instead, the quoted language (and the context in which it is taken) in Johansson merely refers to achieving better throughput with shorter packet sizes than longer packet sizes. Again, this has nothing to do with the conversion process described above and provided in the Appellants' independent claims 1, 6, and 11.

Furthermore, the remainder of Johansson is similarly bereft of any teaching or suggestion of repeating the conversion process in the manner provided by the claimed invention as recited in independent claims 1, 6, and 11. Therefore, Johansson does not teach the elements provided by independent claims 1, 6, and 11, thereby making independent claims 1, 6, and 11 patentable over Johansson. Thus, the Appellants respectfully request that these rejections be reconsidered and withdrawn.

b. Dependent claims 5, 10, and 15

The Office Action refers to col. 6, lines 26-39; col. 7, lines 40-53; and col. 9, lines 24-37 of Johansson as teaching Appellants' claims 5, 10, and 15. However, a closer reading of these sections of Johansson indicates no such teaching. In particular, these sections of Johansson merely refer to null polls. However, they do not teach increasing the polling interval as does the Appellants' claimed invention as recited in claims 5, 10, and 15. It appears that the Office Action has mischaracterized what Johansson teaches with respect to the Appellants' claimed invention based simply on a global word search in Johansson to try and find any reference to an analogous term to a low poll packet (i.e., null packet). However, while Johansson teaches aspects relating to null packet treatment, there is nothing in Johansson that remotely suggests increasing the polling interval when a null packet is sent instead of a data packet. In fact, col. 6, lines 26-39 teach away from the claimed invention where it states, "to determine for example whether the UL queue is empty or the like and thus polling may be suspended for such a slave

unit." This is not the same as increasing the polling interval as in Appellants' claims 5, 10, and 15. Therefore, Johansson does not teach the elements provided by dependent claims 5, 10, and 15, thereby making dependent claims 5, 10, and 15 patentable over Johansson. Thus, the Appellants respectfully request that these rejections be reconsidered and withdrawn.

B. The 35 U.S.C. §103(a) Rejections

1. The Position in the Office Action

Regarding claims 2, 7, and 12, referring to claims 1, 6, and 11, the Office Action admits that Johansson does not expressly disclose that minimizing the number of baseband packets created for each Link layer packet is an SAR-OSU algorithm comprising converting said link layer packet into as many baseband packets of highest capacity 'Cn' as possible and repeating the conversion process on the unconverted bytes using each successive lower capacity baseband packet size until all the unconverted bytes have been converted into baseband packets; however, according to the suggestion in the Office Action, Johansson does disclose that that each link layer packet is broken into variable size baseband packets and repeating the conversion process on the unconverted bytes until all the unconverted bytes have been converted into baseband packets (col. 2, lines 36-38; col. 2, line 64-col. 3, line 2; and col. 8, lines 15-18). The Office Action also concludes that Johansson discloses controlling bandwidth utilization by controlling the baseband packet size (col. 2, line 64-col. 3, line 2). The Office Action further assumes that Johansson discloses that "tradeoffs between packet size and packet overhead along with other link requirements may need to be considered to find optimal utilization and throughput" (col. 4, lines 23-33). Thus, according to the position of the Office Action, it would have been obvious to one of ordinary skill in the art at the time of the invention to minimize the number of baseband packets created for each Link layer packet is an SAR-OSU algorithm by converting a said link layer packet into as many baseband packets of highest capacity 'Cn' as possible and repeating the conversion process on the unconverted bytes using each successive lower capacity baseband packet size until all the unconverted bytes have been converted into baseband packets in order to achieve high bandwidth utilization by minimizing the overhead for the system.

Regarding claims 4, 9, and 14, referring to claims 1, 6, and 11, the Office Action admits that Johansson does not expressly disclose that adaptive scheduling of transmission is an 'AFP' algorithm whereby a baseband packet transmission queue with a size greater than a defined

threshold is continuously polled for a defined number of transmission as long as its size remains greater than said defined threshold; however, according to the conclusion reached in the Office Action, Johansson does disclose that the adaptive scheduling checks to see if a transmission parameter is greater than a threshold in order to allow certain nodes to have additional poling time (additional bandwidth) (col. 6, lines 6-25 and col. 10, lines 1-25). The Office Action also suggests that Johansson discloses that delay in the system should be compensated for to ensure that devices are within the required time limits (col. 4, line 64-col. 5, line 4). Thus, according to the Office Action, it would have been obvious to one of ordinary skill in the art at the time of the invention to have the adaptive scheduling of transmission be an 'AFP' algorithm whereby a baseband packet transmission queue with a size greater than a defined threshold is continuously polled for a defined number of transmissions as long as its size remains greater than said defined threshold in order to ensure that nodes with strict delay requirements that will not meet the delay requirements are given additional bandwidth so that the delay requirements can be met.

Regarding claims 3, 8, and 13, referring to claims 1, 6, and 11, the Office Action supposes that Johansson discloses that master driven TDD/TDMA based wireless network is a Bluetooth network (col 2, lines 18-48). The Office Action admits that Johansson does not expressly disclose that link layer packet is L2CAP packet. The Office Action suggests that Appellants (Appellants) admit as prior art that L2CAP are well known packet in the Bluetooth specification. Thus, according to the position reached in the Office Action, it would have been obvious to one of ordinary skill in the art at the time of the invention to have the link layer packets be L2CAP packets since L2CAP packets are well known in the Bluetooth specification.

2. Appellants' Arguments

a. Dependent claims 2, 7, and 12

Appellants claim a computer implemented system and method for transferring data, which is based on a SAR-Optimum-Slot-Utilization (SAR-OSU) algorithm. This algorithm aims to decrease the transmission delay of L2CAP packets by reducing the queuing delay of baseband packets. The lesser the number of baseband packets per L2CAP packet, the lesser is the end-to-end delay since only a single baseband packet is sent each time a slave is polled. Hence this algorithm maximizes the data sent each time a slave is polled by preferentially sending multi-slot packets." Accordingly, Appellant' claimed invention utilizes an algorithm where each baseband

packet is of a size corresponding to one of a permitted set of capacities 'C_1, C_2, ... Cn'. The Office Action admits that Johansson does not expressly disclose that minimizing the number of baseband packets created for each Link layer packet is an SAR-OSU algorithm, but nonetheless concludes that such a feature is obvious in light of Johansson.

Graham v. John Deere Co., 383 U.S. 1, 86 S.Ct. 684, 15 L.Ed.2d 545, U.S.P.Q. 459 (1966) provides the correct factual inquiries which establish a background for determining obviousness under 35 U.S.C. §103(a). However, the cited tests clearly indicate that the Appellants' claimed invention, and in particular claims 2, 7, and 12 is unobvious in light of Johansson.

First, the scope and content of Johansson is clearly different from the claimed invention. As mentioned, Johansson teaches a method and apparatus for improving channel utilization and throughput in an ad-hoc wireless communication system. A master unit and one or more slave units are coupled to a shared communication channel having at least an uplink (UL) channel and a downlink channel (DL) for each master unit-slave unit pair. A group of active nodes is established corresponding to slave units having UL and/or DL data associated therewith for transfer. The group of active nodes may be polled according to Fair Exhaustive Polling (FEP) and information alternately transferred on a TDD. Accumulated information may be transferred in a batch and feedback information collected and used to adjust polling. One or more links may be identified as lossy links due to increased Bit Error Rate (BER) and accompanying information loss resulting in lower throughput. Virtual active nodes added to the group of active nodes to compensate therefore. A transmission parameter such as number of retransmissions may be evaluated against a predetermined threshold to identify lossy links. If lossy links improve, virtual active nodes may be removed from the group of active nodes. Information associated with the one or more slaves units may be circuit switched synchronous information or non-circuit switched asynchronous information. Feedback information such as timeout information associated with the slave units may be evaluated. If a time out signal associated with a slave unite is received the slave unit may be scheduled for polling responsive to the time out signal. This is different and wholly unique from the Appellants' claimed invention.

Second, there are significant elements of the claimed invention, which are neither taught nor suggested in Johansson. For example, as the Office Action admits Johansson does not teach or suggest a system and method for transferring data, which is based on a SAR-Optimum-Slot-

Utilization (SAR-OSU) algorithm. Third, the level of one of ordinary skill in the art is that of an engineer who works in error detection technology. As such, such an individual would not find the Appellants' claimed invention obvious in light of Johansson. Fourth, the highly complex manipulation of complex engineering formulations required to run the SAR-OSU algorithm, which are provided in the application is an indication that the claimed invention is not obvious in light of Johansson.

Thus, the claimed invention, as amended, meets the above-cited tests for obviousness by including embodiments such as the minimizing of the number of baseband packets created for each Link layer packet is by an SAR-OSU algorithm. As such, claims 2, 7, and 12 of this application are, therefore, clearly in condition for allowance, and it is respectfully requested that the Examiner pass these claims to allowance and issue.

As declared by the Federal Circuit:

> In proceedings before the U.S. Patent and Trademark Office, the Examiner bears the burden of establishing a prima facie case of obviousness based upon the prior art. The Examiner can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. In re Fritch, 23 U.S.P.Q.2d 1780, 1783 (Fed. Cir. 1992) citing In re Fine, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988).

Here, the Examiner has not met the burden of establishing a prima facie case of obviousness. It is clear that Johansson fails to disclose all of the elements of the claims of the claimed invention. The unique elements of the claimed invention are clearly an advance over the prior art.

The Federal Circuit also went on to state:

> The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification. . . . Here the Examiner relied upon hindsight to arrive at the determination of obviousness. It is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the prior art so that the claimed invention is rendered obvious. This court has previously stated that one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention. Fritch at 1784-85, citing In re Gordon, 221 U.S.P.Q. 1125, 1127 (Fed. Cir. 1984).

Here, there is no suggestion that Johansson teaches a structure and method containing all of the limitations of the claimed invention. Nor is there a suggestion in Johansson of modifying Johansson in the manner suggested by the Office Action. Consequently, there is absent the "suggestion" or "objective teaching" that would have to be made before there could be established the legally requisite "prima facie case of obviousness." In view of the foregoing, the Appellants respectfully submit that the cited prior art do not teach or suggest the features defined by dependent claims 2, 7, and 12 and as such, claims 2, 7, and 12 are patentable over Johansson. Thus, the Appellants respectfully request that these rejections be reconsidered and withdrawn.

b. Dependent claims 4, 9, and 14

Appellants claim a computer implemented system and method for transferring data, where the adaptive scheduling of the transmission of baseband packets in the queues is based on, and accomplished by, an AFP (adaptive flow-based polling) algorithm. This algorithm incorporates slave priority based on flow bits, stickiness, and an adaptive polling interval. The Office Action admits that Johansson does not expressly disclose that adaptive scheduling of the transmission of baseband packets in the queues is based on, and accomplished by, an AFP (adaptive flow-based polling) algorithm, but nonetheless concludes that such a feature is obvious in light of Johansson.

Graham v. John Deere Co., 383 U.S. 1, 86 S.Ct. 684, 15 L.Ed.2d 545, U.S.P.Q. 459 (1966) provides the correct factual inquiries which establish a background for determining obviousness under 35 U.S.C. §103(a). However, the cited tests clearly indicate that the Appellants' claimed invention, and in particular claims 4, 9, and 14 is unobvious in light of Johansson.

First, the scope and content of Johansson is clearly different from the claimed invention. As mentioned, Johansson teaches a method and apparatus for improving channel utilization and throughput in an ad-hoc wireless communication system. A master unit and one or more slave units are coupled to a shared communication channel having at least an uplink (UL) channel and a downlink channel (DL) for each master unit-slave unit pair. A group of active nodes is established corresponding to slave units having UL and/or DL data associated therewith for transfer. The group of active nodes may be polled according to Fair Exhaustive Polling (FEP) and information alternately transferred on a TDD. Accumulated information may be transferred

in a batch and feedback information collected and used to adjust polling. One or more links may be identified as lossy links due to increased Bit Error Rate (BER) and accompanying information loss resulting in lower throughput. Virtual active nodes added to the group of active nodes to compensate therefore. A transmission parameter such as number of retransmissions may be evaluated against a predetermined threshold to identify lossy links. If lossy links improve, virtual active nodes may be removed from the group of active nodes. Information associated with the one or more slaves units may be circuit switched synchronous information or non-circuit switched asynchronous information. Feedback information such as timeout information associated with the slave units may be evaluated. If a time out signal associated with a slave unite is received the slave unit may be scheduled for polling responsive to the time out signal. This is different and wholly unique from the Appellants' claimed invention.

Second, there are significant elements of the claimed invention, which are neither taught nor suggested in Johansson. For example, as the Office Action admits Johansson does not teach or suggest a system and method for transferring data, where the adaptive scheduling of the transmission of baseband packets in the queues is based on, and accomplished by, an AFP (adaptive flow-based polling) algorithm. Third, the level of one of ordinary skill in the art is that of an engineer who works in error detection technology. As such, such an individual would not find the Appellants' claimed invention obvious in light of Johansson. Fourth, the highly complex manipulation of complex engineering formulations required to run the SAR-OSU algorithm, which are provided in the application is an indication that the claimed invention is not obvious in light of Johansson.

Thus, the claimed invention, as amended, meets the above-cited tests for obviousness by including embodiments such as the adaptive scheduling of the transmission of baseband packets in the queues is based on, and accomplished by, an AFP (adaptive flow-based polling) algorithm. As such, claims 4, 9, and 14 of this application are, therefore, clearly in condition for allowance, and it is respectfully requested that the Examiner pass these claims to allowance and issue.

As declared by the Federal Circuit:

> In proceedings before the U.S. Patent and Trademark Office, the Examiner bears the burden of establishing a prima facie case of obviousness based upon the prior art. The Examiner can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the

> references. In re Fritch, 23 U.S.P.Q.2d 1780, 1783 (Fed. Cir. 1992) citing In re Fine, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988).

Here, the Examiner has not met the burden of establishing a prima facie case of obviousness. It is clear that Johansson fails to disclose all of the elements of the claims of the claimed invention. The unique elements of the claimed invention are clearly an advance over the prior art.

The Federal Circuit also went on to state:

> The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification. . . . Here the Examiner relied upon hindsight to arrive at the determination of obviousness. It is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the prior art so that the claimed invention is rendered obvious. This court has previously stated that one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention. Fritch at 1784-85, citing In re Gordon, 221 U.S.P.Q. 1125, 1127 (Fed. Cir. 1984).

Here, there is no suggestion that Johansson teaches a structure and method containing all of the limitations of the claimed invention. Nor is there a suggestion in Johansson of modifying Johansson in the manner suggested by the Office Action. Consequently, there is absent the "suggestion" or "objective teaching" that would have to be made before there could be established the legally requisite "prima facie case of obviousness." In view of the foregoing, the Appellants respectfully submit that the cited prior art do not teach or suggest the features defined by dependent claims 4, 9, and 14 and as such, claims 4, 9, and 14 are patentable over Johansson. Thus, the Appellants respectfully request that these rejections be reconsidered and withdrawn.

c. Dependent claims 3, 8, and 13

While Johansson is similar to the common applications running on Bluetooth having data packets of the order of kilobytes, the baseband packets, however, that can be sent through the link in Bluetooth are very small in comparison, 339 bytes being the maximum. As a result, just after the application data packets are received, they need to be fragmented into baseband packets, which will be reassembled into application data packets at the receiving end. The L2CAP layer in Bluetooth is responsible for this purpose. Accordingly, the baseband packets can span 1, 3, or

5 transmission time slots.

Furthermore, Appellants provide that if the application data packets are large, it would be wise to fragment into 5 timeslot packets so as to reduce the total transmission delay, whereas data packets smaller than one time slot, if fragmented as five time slot packets will waste time slots and hence degrade link utilization, for example, as taught by Johansson and other conventional applications. Accordingly, Appellants disclose sending one large multi-slot packet, whereas Johansson merely teaches sending many small packets.

The Office Action suggests that it would have been obvious to one of ordinary skill in the art to have the link layer packets be L2CAP packets. However, one of ordinary skill in the art would not have been motivated to make such a combination in the manner that Appellants have at the time of the invention, otherwise such a teaching would have been specifically identified in Appellants' specification (background), Johansson, or in some other prior art reference. The Office Action does not provide any motivation for such a combination. Thus, the case for In view of the foregoing, the Appellants respectfully submit that the cited prior art do not teach or suggest the features defined by dependent claims 3, 8, and 13 and as such, claims 3, 8, and 13 are patentable over Johansson and Appellants' admitted prior art. Hence, there is no suggestion that Johansson or Appellants' admitted art teaches a structure and method containing all of the limitations of the claimed invention. Nor is there a suggestion in Johansson or Appellants' admitted art of modifying Johansson or Appellants' admitted art in the manner suggested by the Office Action. Consequently, there is absent the "suggestion" or "objective teaching" that would have to be made before there could be established the legally requisite "prima facie case of obviousness." Appellants respectfully request that these rejections be reconsidered and withdrawn.

VIII. CONCLUSION

In view of the foregoing, the Appellant respectfully submit that the cited prior art reference, namely Johansson, does not teach or suggest the features defined by independent claims 1, 6, and 11 and as such, claims 1, 6, and 11 are patentable over Johansson. Further, dependent claims 2-5, 7-10, and 12-15 are similarly patentable over Johansson, not only by virtue of their dependency from patentable independent claims, respectively, but also by virtue of the additional features of the invention they define. Thus, the Appellants respectfully request

that the Board withdraw the rejections to claims 1-15 and pass the application to issue. Please charge any deficiencies and credit any overpayments to Attorney's Deposit Account Number 09-0441.

Respectfully submitted,

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APPENDIX

1. (Previously Presented) A computer implemented system for transferring data over a master driven TDD/TDMA based wireless network characterized in that it operates with minimum delay in end-to-end transmission by including:

means for achieving optimum time slot utilization by minimizing the number of baseband packets created for each Link layer packet, each baseband packet being of a size corresponding to one of a permitted set of capacities 'C1, C2,.....Cn', wherein minimizing the number of baseband packets created for said each Link layer packet comprises converting said Link layer packet into as many baseband packets of highest capacity 'Cn' as possible and repeating a conversion process on unconverted bytes using each successive lower capacity baseband packet size until all the unconverted bytes have been converted into said baseband packets; and

means for optimum sharing of bandwidth, higher link utilization and low baseband packet transmission queue occupancy by adaptive scheduling of the transmission of said baseband packets in said queues.

2. (Previously Presented) A system as claimed in claim 1, wherein said means for minimizing the number of baseband packets created for said each Link layer packet is an SAR-OSU algorithm.

3. (Previously Presented) A system as claimed in claim 1, wherein said master driven TDD/TDMA based wireless network comprises a Bluetooth network and said Link layer packet comprises a L2CAP packet.

4. (Original) A system as claimed in claim 1, wherein said means for adaptive scheduling of transmission is an 'AFP' algorithm whereby a baseband packet transmission queue with a size greater than a defined threshold is continuously polled for a defined number of transmissions as long as its size remains greater than said defined threshold.

5. (Previously Presented) A system as claimed in claim 1 further comprising means for increasing the transmission polling interval for a baseband packet transmission queue with low

packet traffic when a 'poll' packet is sent instead of a 'data' packet.

6. (Previously Presented) A computer implemented method for transferring data over a master driven TDD/TDMA based wireless network characterized in that it operates with minimum delay in end-to-end transmission by:

achieving optimum time slot utilization by minimizing the number of baseband packets created for each Link layer packet, each baseband packet being of a size corresponding to one of a permitted set of capacities 'C1, C2,.....Cn', wherein minimizing the number of baseband packets created for said each Link layer packet comprises converting said Link layer packet into as many baseband packets of highest capacity 'Cn' as possible and repeating a conversion process on unconverted bytes using each successive lower capacity baseband packet size until all the unconverted bytes have been converted into said baseband packets; and

maintaining optimum sharing of bandwidth, higher link utilization and low baseband packet transmission queue occupancy by adaptive scheduling of the transmission of said baseband packets in said queues.

7. (Previously Presented) A method as claimed in claim 6, wherein said minimizing the number of said baseband packets created for said each Link layer packet is by an SAR-OSU algorithm.

8. (Previously Presented) A method as claimed in claim 6, wherein said master driven TDD/TDMA based wireless network comprises a Bluetooth network and said Link layer packet comprises a L2CAP packet.

9. (Original) A method as claimed in claim 6, wherein said adaptive scheduling of transmission is by an 'AFP' algorithm whereby a queue with a size greater than a defined threshold is continuously polled for a defined number of transmissions as long as its size remains greater than said defined threshold.

10. (Previously Presented) A method as claimed in claim 6 further comprising increasing the transmission polling interval for a baseband packet transmission queue with low packet traffic

when a 'poll' packet is sent instead of a 'data' packet.

11 (Previously Presented) A computer program product comprising computer readable program code stored on computer readable storage medium embodied therein for causing a computer to transfer data over a master driven TDD/TDMA based wireless network characterized in that it operates with minimum delay in end-to-end transmission by including:

a computer readable program code adapted to achieving optimum time slot utilization by minimizing the number of baseband packets created for each Link layer packet, each baseband packet being of a size corresponding to one of a permitted set of capacities 'C1, C2,.....Cn', wherein minimizing the number of baseband packets created for said each Link layer packet comprises converting said Link layer packet into as many baseband packets of highest capacity 'Cn' as possible and repeating a conversion process on unconverted bytes using each successive lower capacity baseband packet size until all the unconverted bytes have been converted into said baseband packets; and

a computer readable program code adapted to implementing optimum sharing of bandwidth, higher link utilization and low baseband packet queue occupancy by adaptive scheduling of the transmission of said baseband packets in said queues.

12. (Previously Presented) A computer program product as claimed in claim 11, wherein said computer readable program code adapted to minimizing the number of baseband packets created for said each Link layer packet is an SAR-OSU algorithm.

13. (Previously Presented) A computer program product as claimed in claim 11, wherein said master driven TDD/TDMA based wireless network comprises a Bluetooth network, and said Link layer packet comprises a L2CAP packet.

14. (Previously Presented) A computer program product as claimed in claim 11, wherein said computer readable program code adapted to adaptive scheduling for transmission comprises an 'AFP' algorithm whereby a queue with a size greater than a defined threshold is continuously polled for a defined number of transmissions as long as its size remains greater than the defined threshold.

15. (Previously Presented) A computer program product as claimed in claim 11 further comprising a computer readable program code adapted to increasing the transmission polling interval for a baseband packet transmission queue with low packet traffic when a 'poll' packet is sent instead of a 'data' packet.